

Appl. No. : 10/674,694
Filed : September 30, 2003

AMENDMENTS TO THE CLAIMS

1. (Currently amended) A method for filtering a feed liquid, the method comprising:

providing a vessel;

providing a membrane module, the membrane module comprising a plurality of porous hollow fiber membranes, the membranes comprising a plurality of pores and an outer surface, wherein the membranes are mounted in a header in close proximity to one another so as to prevent excessive movement therebetween, wherein the membranes form an array, wherein the membrane module is configured such that gas bubbles may can be introduced into the membrane module, and wherein the membrane module is contained within the a separate vessel, and wherein the module is positioned vertically in the vessel;

providing a feed liquid to the vessel, the feed liquid comprising a fouling material, wherein the feed liquid is provided to the vessel at a rate sufficient to cause an overflow;

applying a transmembrane pressure to the membranes in the module, whereby a filtrate passes through pores in the membranes, thereby producing, in the vessel, a concentrated feed comprising the fouling material in the vessel accumulated solids; and

removing the fouling material accumulated solids from the vessel, wherein the fouling material is accumulated solids are carried out of the vessel in the overflow therefrom at the top of the vessel.

2. (Currently amended) The method according to claim 1, further comprising:

connecting the header to a source of a pressurized gas; and

providing, through the header but not through the pores of the membranes, gas bubbles in a uniform distribution relative to the porous membrane array such that the gas bubbles move past the outer surfaces of the membranes and vibrate the membranes to dislodge the fouling material accumulated solids therefrom.

3. (Original) The method according to claim 1, further comprising:

mounting the membranes relative to one another so as to produce a rubbing effect between the membranes when vibrated.

4. (Original) The method according to claim 3, wherein the hollow fiber membranes are arranged in at least one bundle.

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5. (Original) The method according to claim 4, wherein the bundle is surrounded by a perforated cage, whereby excessive movement between the hollow fiber membranes is prevented.

6. (Original) The method according to claim 4, comprising the additional step of:

providing gas bubbles from within the module through gas distribution holes or openings in the header.

7. (Original) The method according to claim 1, further comprising:

providing gas bubbles from within the module through at least one tube situated within the module.

8. (Original) The method according to claim 7, wherein the tube comprises a plurality of holes.

9. (Original) The method according to claim 7, wherein the tube comprises a comb of tubes.

10-12. (Canceled)

13. (Original) The method according to claim 1, further comprising:
scouring the membranes.

14. (Original) The method according to claim 13, wherein the step of scouring comprises liquid backwashing.

15. (Original) The method according to claim 13, wherein the step of scouring comprises pressurized gas backwashing.

16. (Original) The method according to claim 13, wherein the step of scouring comprises chemically cleaning.

17. (Original) The method according to claim 13, wherein the step of scouring comprises chemically dosing.

18. (Original) The method according to claim 13, wherein the scouring is continuous.

19. (Original) The method according to claim 13, wherein the scouring is intermittent.

20-23. (Canceled)

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24. (Currently amended) A method of removing accumulated solids from an outer surface of a plurality of porous hollow fiber membranes, the method comprising:

providing a plurality of porous hollow fiber membranes, the porous hollow fiber membranes extending longitudinally in an array to form a membrane module, wherein the membranes are arranged in close proximity to one another and mounted to prevent excessive movement therebetween, wherein the module is contained within a separate vessel, and wherein the module is positioned vertically in the vessel;

providing, from within the array, by means other than gas passing through the pores of the membranes, uniformly distributed gas bubbles, the distribution being such that the bubbles pass substantially uniformly between each membrane in the array to scour the surface of the membranes, vibrate the membranes, and remove accumulated solids from within the membrane module; and

removing accumulated solids from the vessel, wherein the accumulated solids are carried out of the vessel in an overflow ~~of a concentrated feed therefrom at the top of the vessel.~~

25. (Original) The method according to claim 24, wherein the membranes are mounted vertically to form the array and the bubbles pass generally parallel to a longitudinal extent of the fibers.

26. (Original) The method according to claim 25, wherein the uniformly distributed gas bubbles are provided at a lower end of the array.